



For Network Personnel Only

TECHNICAL INFORMATION BULLETIN

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Network Gives Good Performance

On first evaluation, the AS-205 mission was an unqualified success and will set the stage for even more difficult and exacting Apollo space missions.

According to the Network Operations Manager's Report for the AS-205 mission, just published, the MSFN support of the mission was excellent and far exceeded expectations. The report pointed out that considering the difficulties during the premission period, the complexities of the Apollo network equipment and interfaces, and the volume of documentation that had to be absorbed, the MSFN performed exceptionally well. The report said that certain problem areas created difficulties but they did not drastically affect mission support.

A summary of system performance follows:

Unified S-band--The MSFN USB systems performed well, considering the total support time involved. There were 28 data losses that can be attributed to

known equipment failures or operator errors. Of these, 13 were sidelobe track. In addition to known errors many data losses and dropouts occurred that were attributed to weak signals received due to spacecraft aspect angle, low elevation passes, handovers, and antenna keyhole limitations.

At approximately two hours after liftoff the Network Controller requested stations to provide teletype reports of USB voice quality for the first four revolutions. Most stations reported that USB downlink voice was excellent. At T+7 the Network Controller instructed the Network to consider USB downlink voice as prime after achieving 2-way lock.

Other problem areas were concerned with the spacecraft omniantenna system monitor failures, 1218 Computer (five stations had problems which resulted in inability to process 29-point acquisition messages), antenna coordinates at MADX, loss of PM subcarriers, Y-

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One of the most successful tests during the AS-205 Mission, at least from the public's standpoint, was the use of the command module television system. This photograph of Captain Walter Schirra was taken directly from the spacecraft downlink FM television system at the Goldstone-Apollo station. It was taken during the 60th revolution of the spacecraft at approximately 1430 GMT, October 15, 1968. The photo, taken by W. O. Wood, from the recordings system monitor, has extremely good definition and clarity. The NASA Station Director at the Goldstone station is George W. Fariss.

Corrosion Study Prepared For MSFN

A one year study of corrosion control on MSFN facilities has been completed and is being distributed.

The report deals specifically with the corrosion impact on the network and discusses this impact for both engineering and managerial personnel in terms of years of life and dollar cost of corrosion control. The greater part of the report deals with the science of electrochemical corrosion as found at the stations, the natural corrosion, resistance of metals and alloys, the proper surface preparation and painting of metals, metallic coatings used to protect metals, and control of corrosion.

The report emphasizes the importance in understanding that corrosion is a very complex action and that it destroys between \$6,500,000 and \$10,000,000 in the United States each year. It is pointed out that the MSFN tracking facilities are confronted with only one type of corrosion - electrochemical, but there are many variations of electrochemical corrosion. Probably the most important thing to remember is that there are proved procedures and methods to economically control the variations of electrochemical corrosion at the tracking stations. The study and report on corrosion control has been designed to assist the MSFN Staff.

The corrosion study will be changed and augmented at intervals as new knowledge is gained; as better application to the tracking stations is formulated; and as experience dictates. The study is designed to keep abreast of the latest technology in corrosion control as it applies to the MSFN.

Watertown Released From Apollo Support

The Apollo tracking ship, USNS Watertown, has been released by the National Aeronautics and Space Administration from its priority role of reentry support for Apollo missions.

MSFN land stations along reentry paths in the Pacific Ocean, together with the Apollo tracking ship, Huntsville, and Apollo Range Instrumentation Aircraft which operate as part of the Network, will provide coverage for returning Apollo spacecraft landing in a preselected area of the Pacific.

The Air Force, which has operated the Watertown for the Apollo Program, plans to use the ship for space research test support in lieu of making extensive modifications to one of its older telemetry ships.

Some of NASA's specialized Apollo
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Ops Doc Status

The following operations documentation has been distributed recently:

Network Operations Manager's report for the AS-205 mission--distributed October 30.

AS-503 Mission Supplements to the NOD (scheduled launch 4th quarter, 1968)--distributed October 22. (Supporting stations: CNV, PAT, MIL, MLA, GBI, GBM, GTK, ANG, BDA, ACN, MAD, CYI, PRE, TAN, CRO, HSK, GWM, HAW, CAL, WHS, GDS, GYM, TEX, RED, VAN, MER, HTV, ARIA (6).

Network Operations Plan for Mariner Mars 69 (launch scheduled 1st quarter, 1969)--distributed October 28. (Supporting stations: ACN, BDA).

Network Operations Plan for Pioneer-D Launch Vehicle Support (launch scheduled November 6)--distributed October 12. (Supporting stations: BDA, ACN, ANG, CRO, GWM, HAW, GBM, MIL, TAN.)

Network Operations Plan for test and Training Satellite-B (launch scheduled November 6)--distributed October 11. (Supporting stations: All fixed ground stations, and instrumented ships HTV, RED, and MER.)

Change 1 to Revision 2 of the Network Operations Directive--distributed October 26.

Documents scheduled for distribution in the near future include: Program Support Plan for the AS-V PSRD.

Documentation Briefing Report for AS-503 Mission--distributed October 29, 1968.

Network Operations Plan Intelsat III-F-2 Mission

Network Operations Plan for the Highly Elliptical orbiting Satellite (HEOS-A).

Watertown Released

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Instrumentation has been removed from the Watertown and some new instrumentation will be installed by the Air Force. The general purpose tracking and telemetry capabilities of the ship, including the inertial navigational system, will be retained.

The Watertown's most recent space mission work includes support for NASA's Radio Astronomy Explorer 38 satellite.

Change to NOD

Change 1 to Revision 2 of the "Network Operations Directive" has recently been distributed. This change incorporates ISI's and PDC's from the AS-205 Mission that were determined to be appropriate for inclusion in the NOD. In addition, many recommendations from station personnel were included.



The Manned Space Flight Network Operations Center at Goddard Space Flight Center was a busy and important place during the AS-205 Mission. For the 11-day mission, network personnel there performed a major role in keeping the MSFN fully operational to support this major Apollo manned mission.

Network Performance

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angle bias and CADFISS testing at Guam.

C-band Radar--The MSFN C-band radars performed well for the entire mission.

There were 11 data loss problems recorded on S-IVB/IU tracking and 6 with CSM tracking.

Some data loss was experienced when the S-IVB tumbled because of a 7 MHz deviation existed between the S-IVB and the IU frequencies, although they were to have been identical.

Telemetry--Considering the number of innovations introduced for this mission, the overall performance of the MSFN telemetry system was excellent. The interface and procedural problems caused by new equipment configuration were resolved during the NRT period. However, the NOM report pointed out, some of these interim solutions were mission oriented and will require further engineering for future missions.

No known complete data losses (where data could not be recovered from magnetic tape) were attributable to the telemetry equipment. Several data loss problems were encountered.

Command--ACN, ANT, BDA, CNV, CRO, CYI, GBI, GWM, HAW, TEX, and VAN were required for UHF command support. At the beginning of the mission period, all UHF command equipment was ready to support. There

were several hardware failures during prelaunch period, but by launch all equipment was Green. The only UHF support failure during a pass occurred at TEX during Rev. 1. The only other postlaunch failure (at ACN) did not interfere with mission support.

With the exception of the TEX failure on Rev. 1, all UHF command stations fulfilled mission support requirements. UHF commands were uplinked on Rev's 2, 3, 4, and 5 at ACN, CNV, CRO, HAW, and TEX.

ARIA, SPAN, air-to-ground communications, and MSFNOC communications all performed well with only minor discrepancies.

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